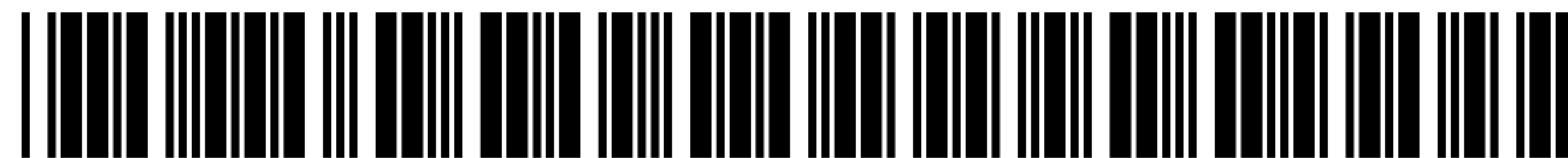


Exhibit 2



US009428100B2

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(45) **Date of Patent:** ***Aug. 30, 2016**

(54) **PORTABLE SOLAR LIGHT TOWER**

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patent is extended or adjusted under 35
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claimer.

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Mar. 8, 2010, now Pat. No. 8,733,963.

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12, 2009.

(51) **Int. Cl.**

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B60P 3/18 (2006.01)
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B62D 63/08 (2006.01)
F21K 99/00 (2016.01)
F21L 4/08 (2006.01)
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F21S 9/03 (2006.01)
F21W 131/10 (2006.01)
F21Y 101/02 (2006.01)

(52) **U.S. Cl.**

CPC **B60Q 1/0029** (2013.01); **B60P 3/18**
(2013.01); **B62D 63/08** (2013.01); **F21K 9/30**
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(2013.01); **F21V 21/22** (2013.01); **F21V 21/26**
(2013.01); **F21S 9/03** (2013.01); **F21W**
2131/1005 (2013.01); **F21Y 2101/02** (2013.01)

(58) **Field of Classification Search**

CPC F21L 14/04; F21V 21/22; F21S 9/035;
F21S 9/03

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,220,981 A * 9/1980 Koether B60P 3/18
362/238
4,421,943 A * 12/1983 Withjack F24J 2/5264
126/569
4,481,562 A 11/1984 Hickson
5,155,606 A 10/1992 Landesman
5,522,943 A 6/1996 Spencer et al.
5,524,398 A * 6/1996 Miller B60P 3/18
182/207
5,611,177 A 3/1997 Herbstritt
5,618,680 A 4/1997 Miron et al.
5,808,450 A 9/1998 Chula et al.
5,905,356 A 5/1999 Wells
5,969,501 A * 10/1999 Glidden F24J 2/523
320/101
6,201,181 B1 3/2001 Azzam et al.
6,396,239 B1 5/2002 Benn et al.

(Continued)

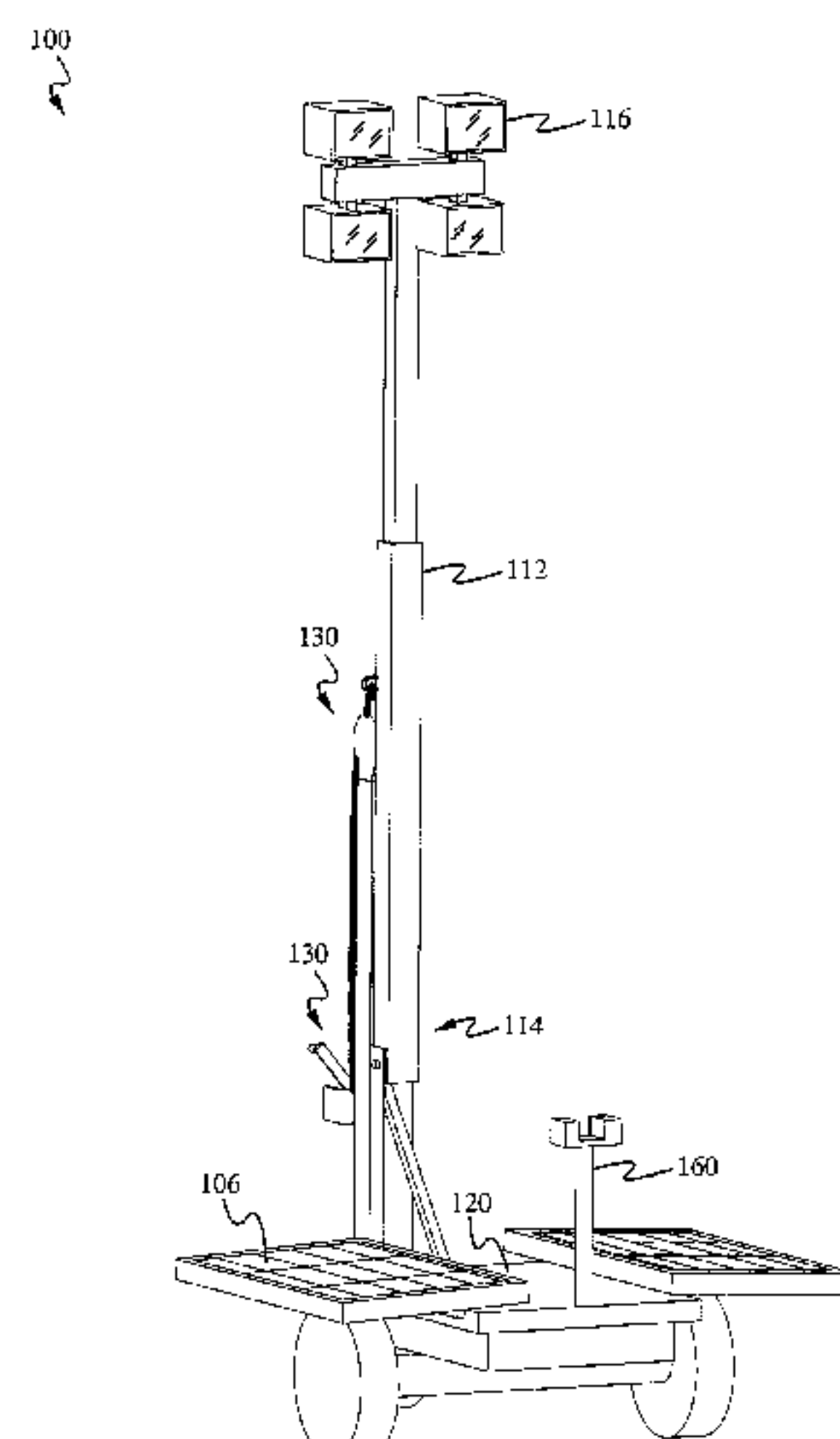
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(57) **ABSTRACT**

A portable solar light tower includes a trailer mounted
extension tower outfitted with high output Light Emitting
Diode (LED) flood lights. The portable solar light tower also
includes a set of solar panels which fold up for travel mode
and fold down for charging mode. A battery bank is housed
in a locking compartment built into the trailer deck.

25 Claims, 9 Drawing Sheets



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(56)

References Cited

U.S. PATENT DOCUMENTS

6,476,311 B1

11/2002

Lee et al.

6,799,742 B2

10/2004

Nakamura

6,972,689 B1 *

12/2005

Morgan G09F 21/04

340/815.4

7,089,705 B1

8/2006

Liberman

7,135,990 B2

11/2006

Rihardson et al.

7,324,409 B1 *

1/2008

Zweesaardt A01M 29/06

367/139

D584,223 S *

1/2009

Cooper D13/102

2005/0068765 A1

3/2005

Ertze Encinas et al.

2005/0161079 A1

7/2005

Gray

2007/0251132 A1 *

11/2007

Luoma G09F 9/33

40/541

2008/0053510 A1

3/2008

Lin et al.

2008/0210289 A1

9/2008

Chen

2008/0298051 A1

12/2008

Chu

2009/0007958 A1

1/2009

Ho et al.

2009/0079161 A1 *

3/2009

Muchow F03D 1/001

280/400

2009/0231838 A1

9/2009

Kim

2009/0266352 A1

10/2009

Wetmore

2010/0109910 A1 *

5/2010

Fahey G08G 1/095

340/908

2010/0212659 A1 *

8/2010

Carpoff F24J 2/5233

126/627

2011/0005573 A1

1/2011

Chang et al.

2012/0206087 A1 *

8/2012

Carpoff H02J 7/355

320/101

2012/0291847 A1 *

11/2012

Rowe, Jr. H02S 30/20

136/245

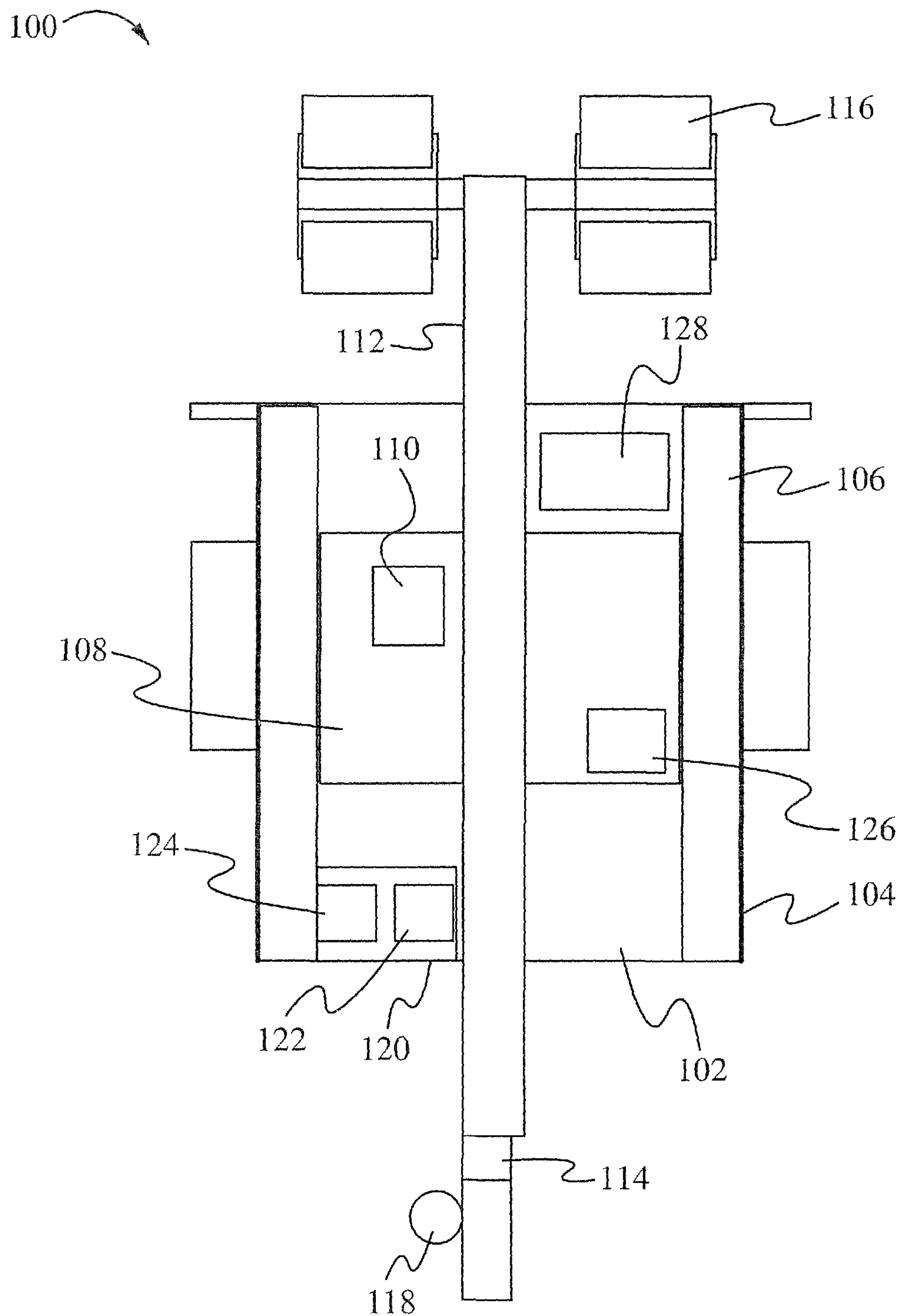
2012/0313569 A1 *

12/2012

Curran F24J 2/523

320/101

* cited by examiner

**Fig. 1**

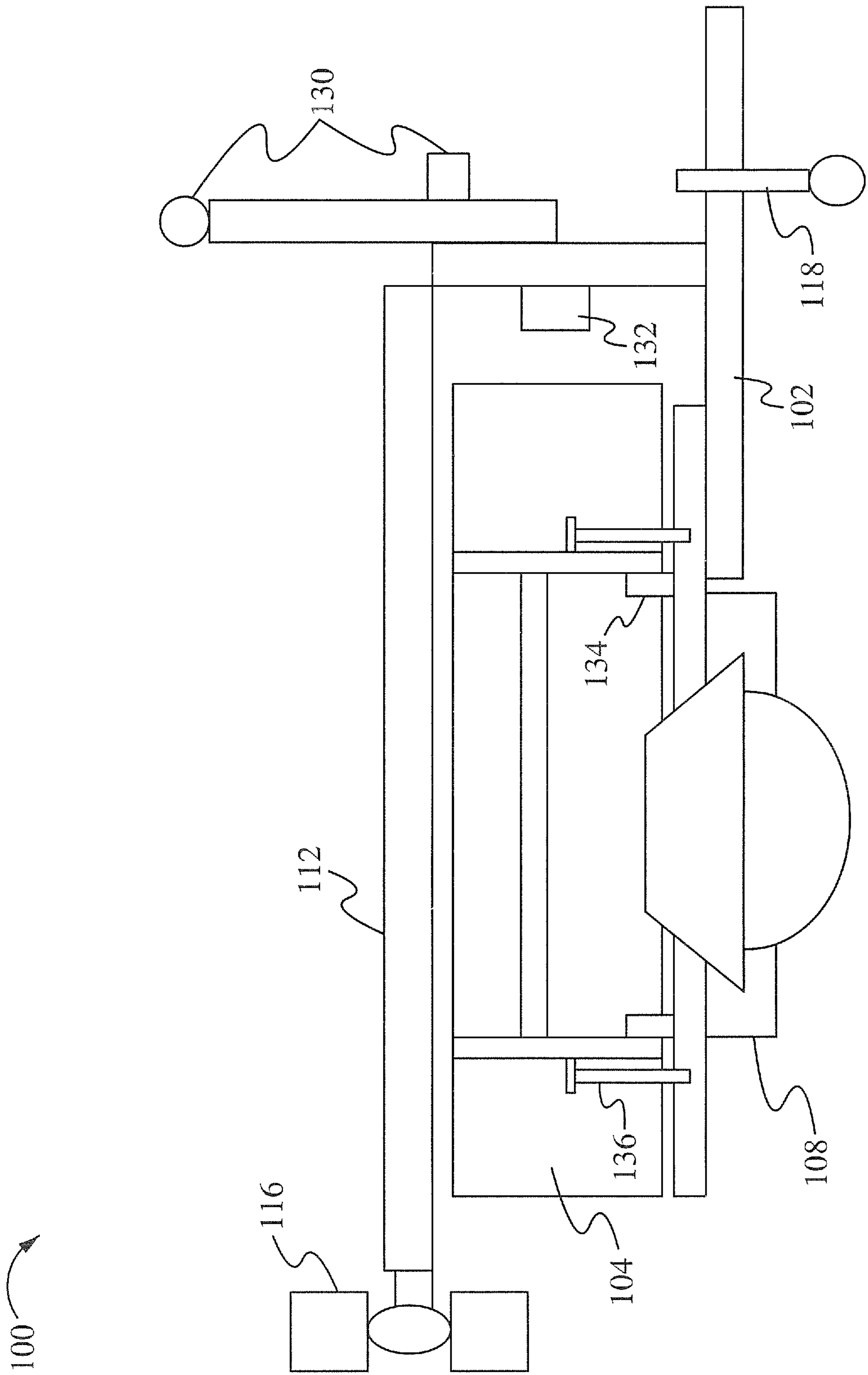


Fig. 2

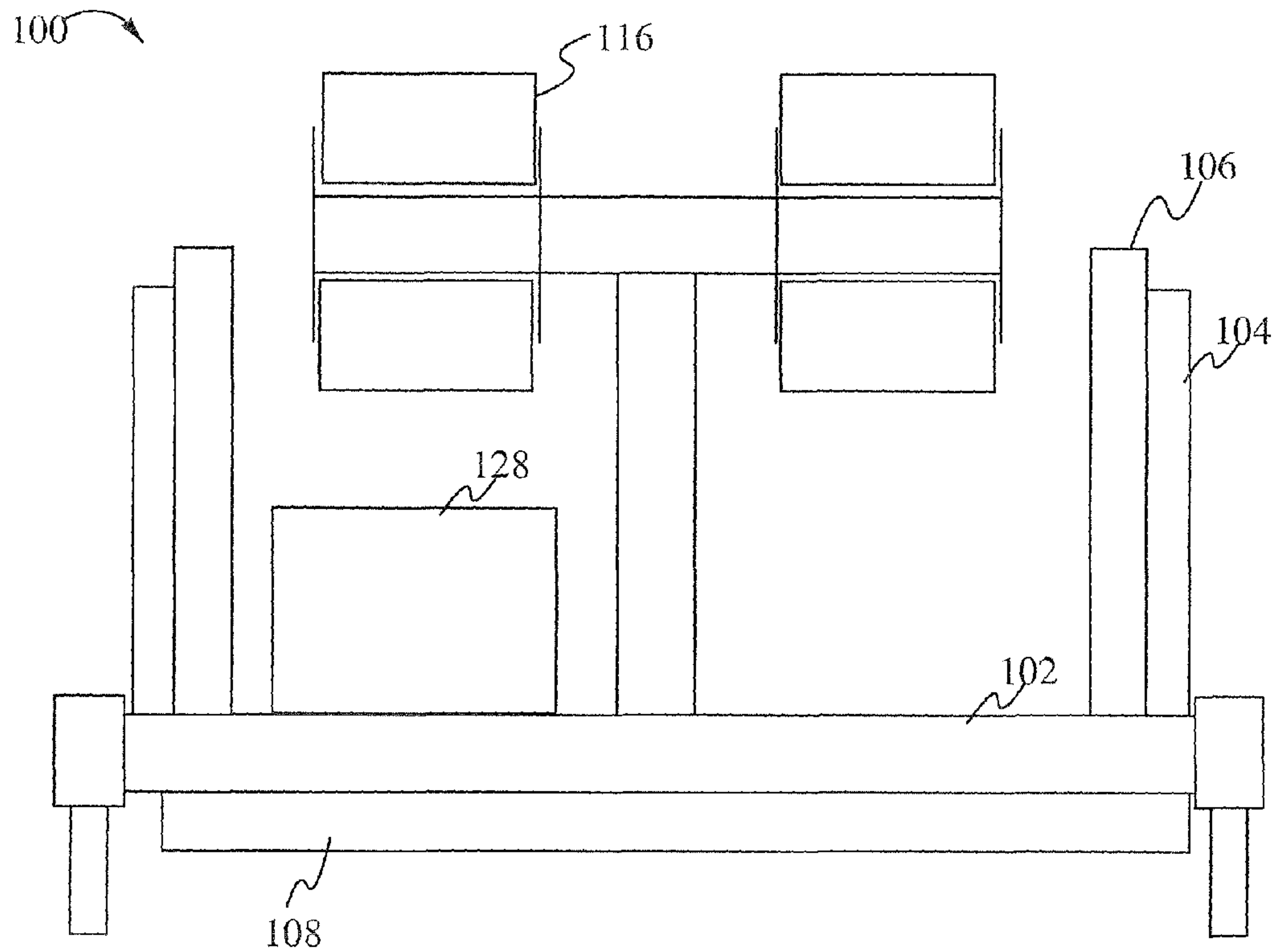


Fig. 3

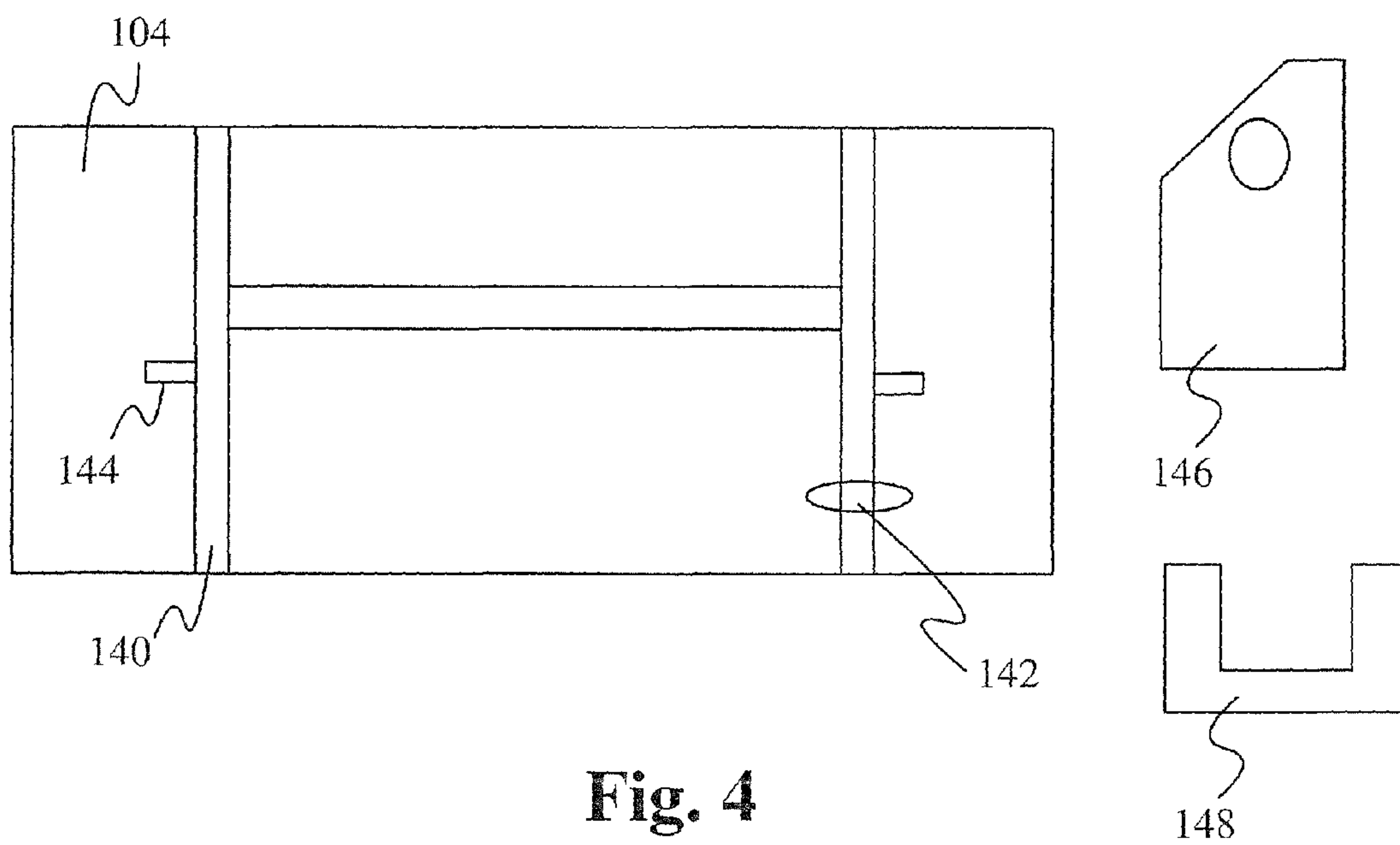


Fig. 4

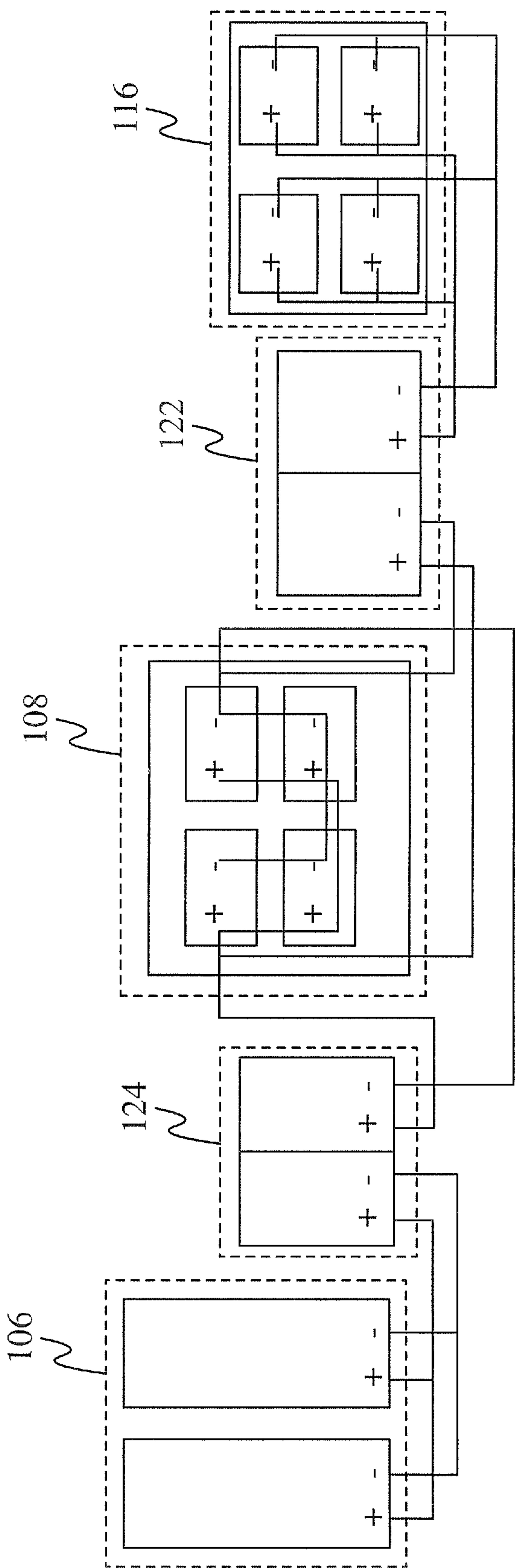
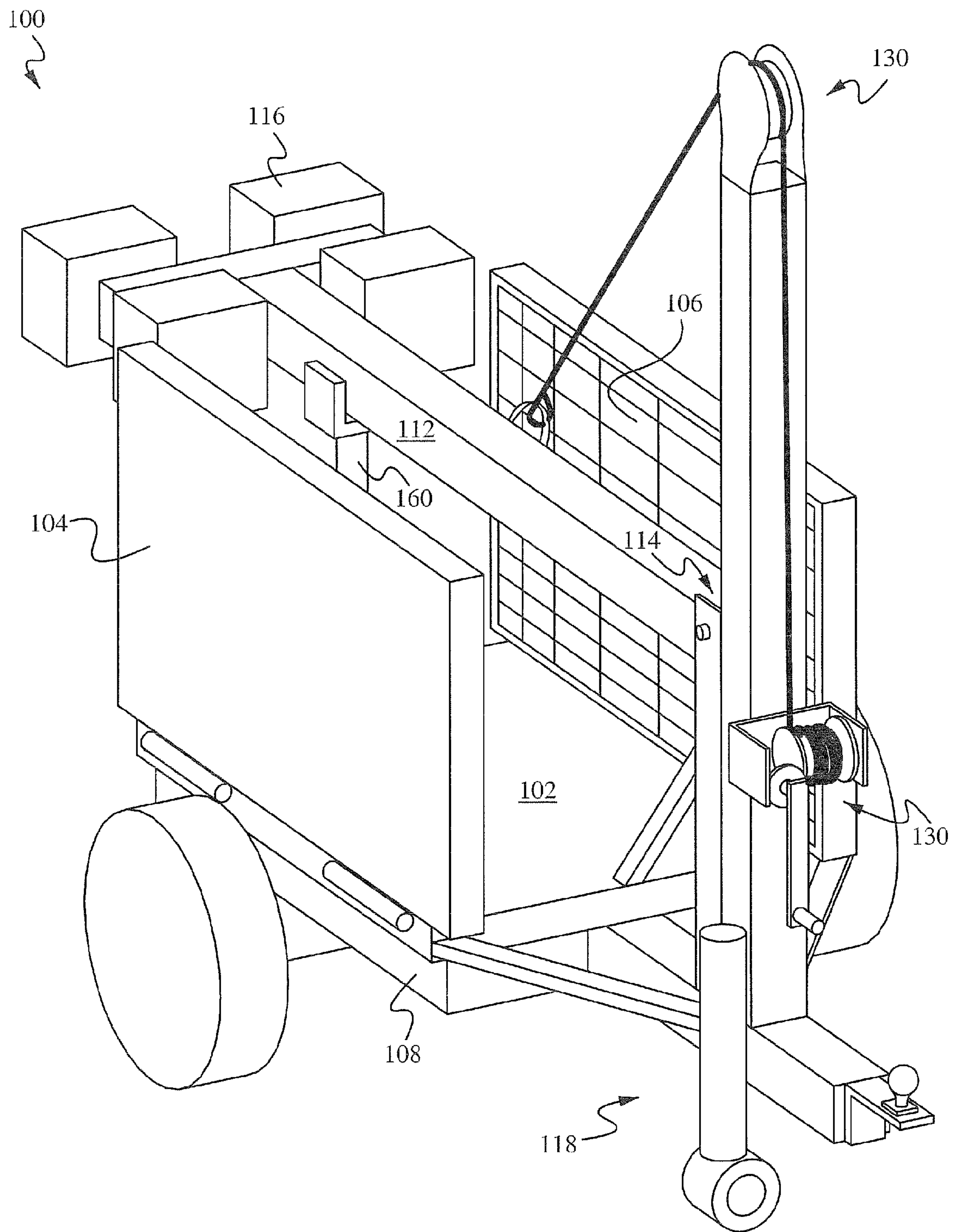
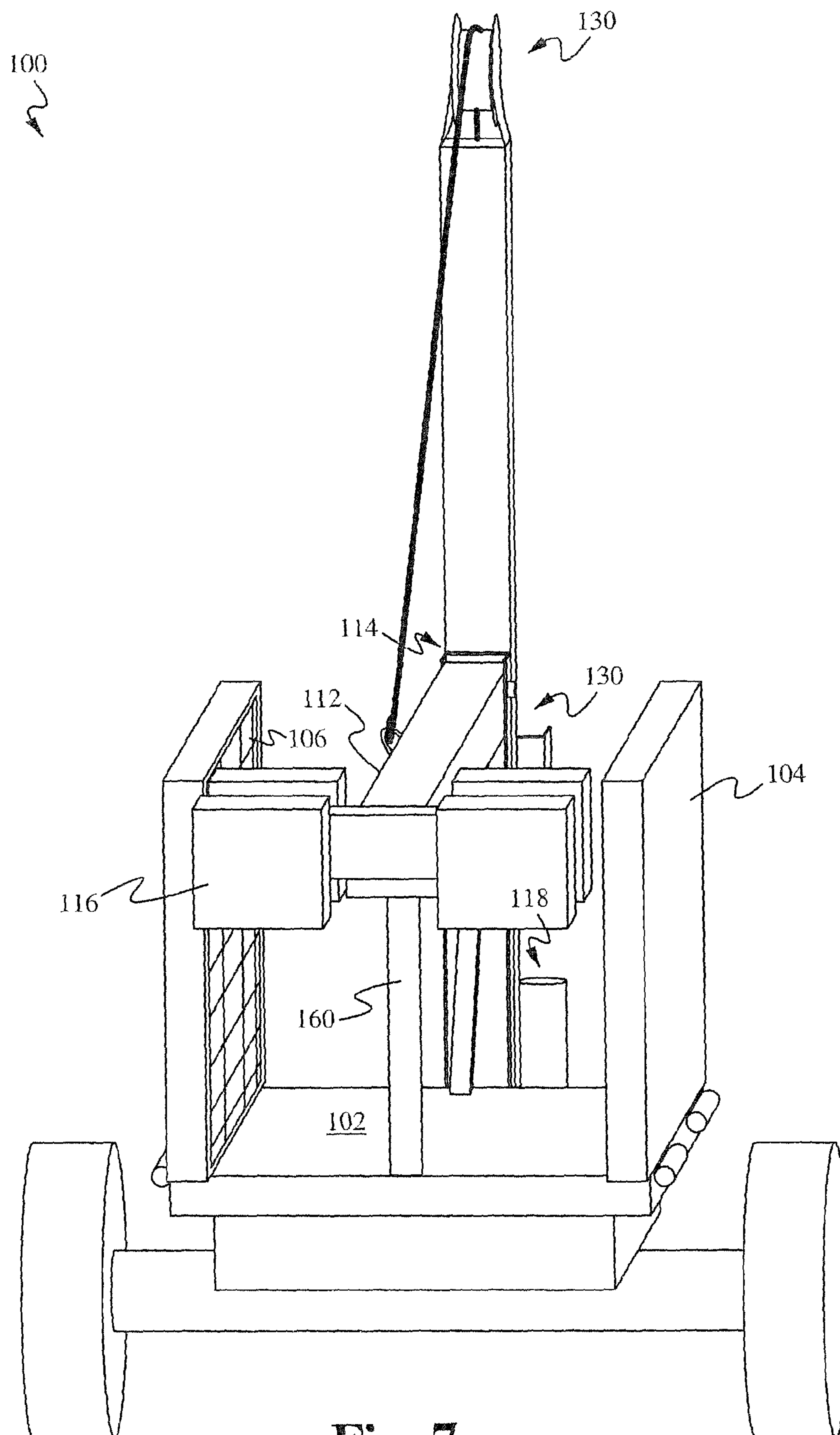
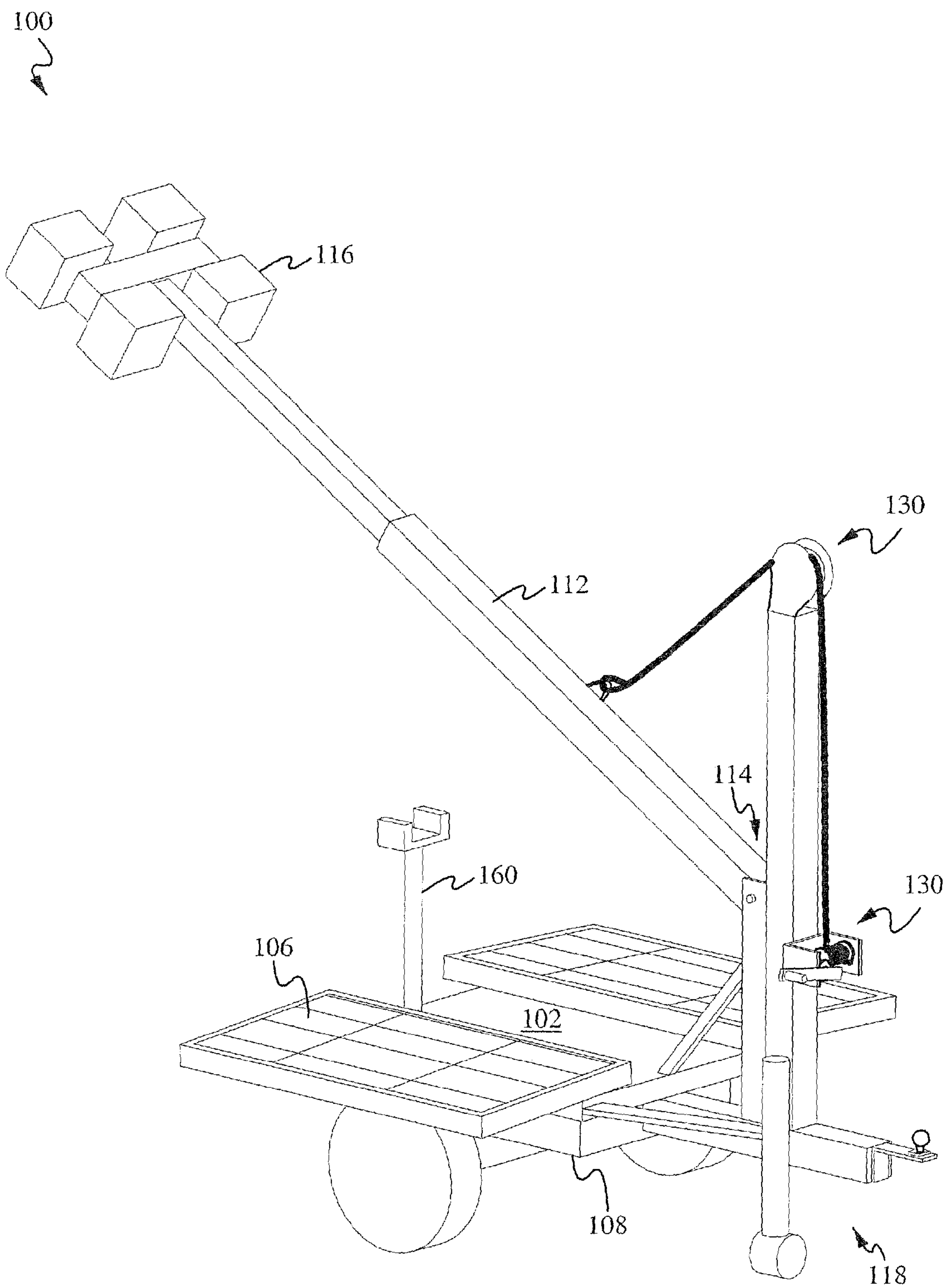
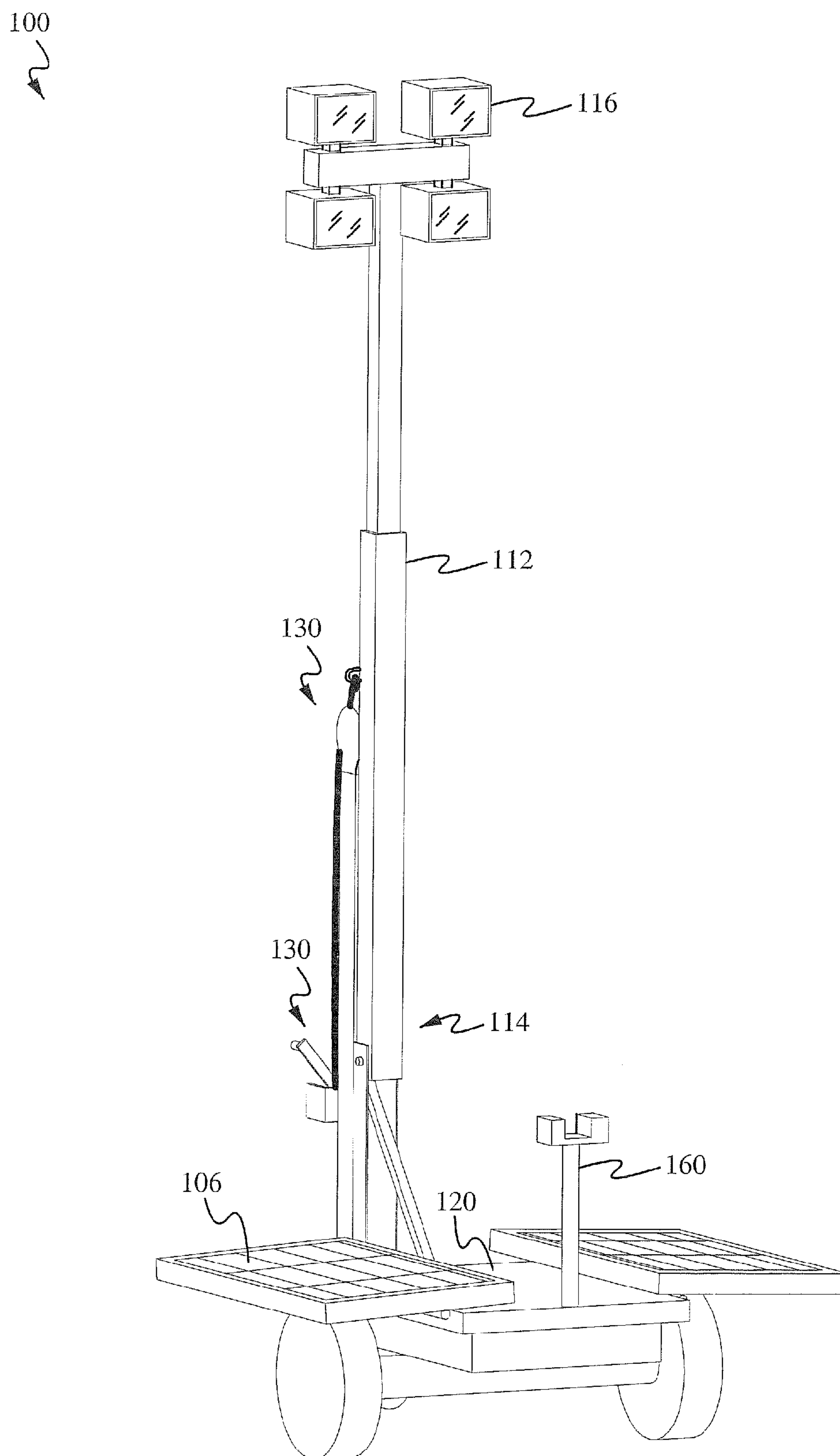


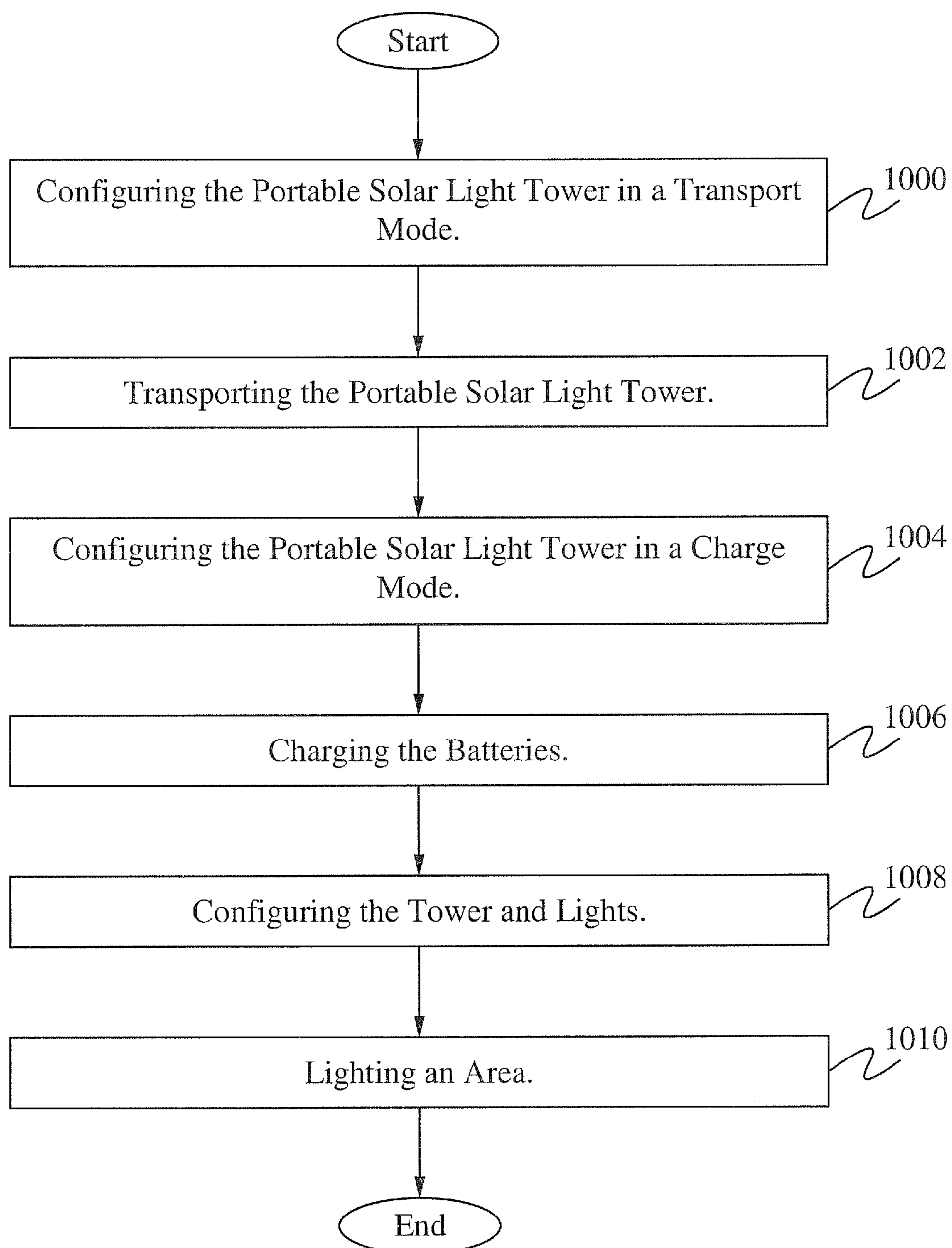
Fig. 5

**Fig. 6**

**Fig. 7**

**Fig. 8**

**Fig. 9**

**Fig. 10**

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PORTABLE SOLAR LIGHT TOWER

CROSS-REFERENCE TO RELATED
APPLICATION(S)

This application is a continuation of co-pending U.S. patent application Ser. No. 12/719,409, filed on Mar. 8, 2010, titled "PORTABLE SOLAR LIGHT TOWER", which claims priority under 35 U.S.C. 119(e) of the U.S. Provisional Patent Application Ser. No. 61/159,699, filed Mar. 12, 2009 and entitled, "PORTABLE SOLAR LIGHT TOWER," both of which are hereby incorporated by reference in their entireties for all purposes.

FIELD OF THE INVENTION

The present invention relates to the field of lighting systems and devices. More specifically, the present invention relates to the field of portable lighting systems and devices that use solar power.

BACKGROUND OF THE INVENTION

Road construction is preferably done at night when traffic is low, and the affect on drivers and traffic is minimized. Other construction is performed during the night as well. However, at night, large lights or at least powerful lights are used to illuminate the work area so that the workers are able to see. These large lights are high wattage lights which run using a diesel powered generator. With the volatility of oil prices, diesel is, at times, very expensive, causing the cost of using the lights to increase substantially.

SUMMARY OF THE INVENTION

A portable solar light tower includes a trailer mounted extension tower outfitted with high output Light Emitting Diode (LED) flood lights. The solar light tower also includes a set of solar panels which fold up for travel mode and fold down for charging mode. A battery bank is housed in a locking compartment built into the trailer deck. The tower is able to be raised and lowered. In operation, the solar panels charge the batteries which then power the lights at night providing a portable, no emission and no noise, light source.

In one aspect, a solar power device comprises a portable base, a solar panel coupled to the portable base for converting solar energy into electricity and a light coupled to the portable base for illuminating an area using the electricity from the solar panel. The device further comprises a protective back plate for protecting the solar panel. The device further comprises a battery for storing the electricity and providing the electricity to the light. The device further comprises a control panel for controlling the light and the solar panel. The device further comprises a pivotable, telescoping tower coupling the light to the portable base, wherein the telescoping tower is extendable and pivotable between a down position to an up position. The device further comprises a winch and pulley system for moving the telescoping tower between the down position to the up position. The device further comprises anti-slam shock absorbers coupled to the portable base for preventing the solar panel from slamming open. The portable base is a trailer. The solar panel is rotatable to an open position to acquire the solar energy and a closed position to protect the solar panel. The light is selected from the group consisting of one or more floodlights and one or more light emitting diode floodlights.

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In another aspect, a solar powered battery operated portable light tower, comprises a frame, a first enclosure supported by the frame, the enclosure including one or more batteries, a second enclosure containing controls, an extension tower including a set of light emitting diode floodlights, a cable winch and pulley system to extend and contract the tower and one or more solar panels mounted on pivotal brackets each with a protective back plate and anti-slam shock absorbers. The controls comprise a control panel for controlling the set of light emitting diode floodlights and the one or more solar panel. The tower comprises a pivotable, telescoping tower coupling the floodlights to the frame, wherein the telescoping tower is extendable and pivotable between a down position to an up position. The frame is a trailer. The solar panel is rotatable to an open position to acquire the solar energy and a closed position to protect the solar panel.

In another aspect, a method of utilizing a portable solar light tower comprises configuring a portable solar light tower in a transport mode, transporting the portable solar light tower, configuring the portable solar light tower in a charge mode, charging a battery using a solar panel of the portable solar light tower, configuring the portable solar light tower in a light mode and lighting an area. Configuring the portable solar light tower in the transport mode includes placing a tower in a down position and placing the solar panel in a protected position with a back plate protecting the solar panel. Transporting includes trailing the portable solar light tower. Configuring the portable solar light tower in the charge mode includes placing the solar panel in a position to receive sunlight. Configuring the portable solar light tower in the light mode includes raising a tower into a substantially upright position.

In another aspect, a system for illuminating an area at night using a renewable energy source comprises an energy acquisition component acquiring energy from the renewable energy resource, a protective component for protecting the energy acquisition component, a lighting component for illuminating the area and a raising component for raising the lighting component. The system further comprises a transporting component for transporting the system. The transporting component is a trailer. The system further comprises a battery for storing the electricity and providing the electricity to the light. The system further comprises a control component for controlling the lighting component and the energy acquisition component. The raising component comprises a pivotable, telescoping tower coupling the lighting component to the transporting component, wherein the telescoping tower is extendable and pivotable between a down position to an up position. The raising component comprises a winch and pulley system for moving the telescoping tower between the down position to the up position. The protective component further comprises anti-slam shock absorbers for preventing the energy acquisition component from slamming open. The energy acquisition component is rotatable to an open position to acquire solar energy and a closed position to protect the energy acquisition component. The light is selected from the group consisting of one or more floodlights and one or more light emitting diode floodlights.

BRIEF DESCRIPTION OF THE DRAWINGS:

FIG. 1 illustrates a top view of a portable solar light tower in a travel mode in accordance with some embodiments.

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FIG. 2 illustrates a side view of a portable solar light tower in a travel mode in accordance with some embodiments.

FIG. 3 illustrates a rear view of a portable solar light tower in a travel mode in accordance with some embodiments.

FIG. 4 illustrates a top view of a solar panel backplate in accordance with some embodiments.

FIG. 5 illustrates an exemplary wiring diagram for the portable solar light tower in accordance with some embodiments.

FIG. 6 shows a back perspective view of a portable solar light tower in a travel mode in accordance with some embodiments.

FIG. 7 shows a front perspective view of a portable solar light tower in a travel mode in accordance with some embodiments.

FIG. 8 shows a back perspective view of a portable solar light tower converting from a travel mode to a use and/or charge mode in accordance with some embodiments.

FIG. 9 shows a front perspective view of a portable solar light tower in a use and/or charge mode in accordance with some embodiments.

FIG. 10 illustrates a flowchart of a method of utilizing the portable solar light tower in accordance with some embodiments.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A portable solar light tower utilizes solar power to charge one or more batteries and then uses the batteries to power a set of lights.

FIG. 1 illustrates a top view of a portable solar light tower **100** in a travel mode in accordance with some embodiments. The portable solar light tower **100** includes several components such as a frame **102**, backplates **104**, one or more solar modules **106**, a battery enclosure/box **108**, one or more batteries **110**, a tower **112**, a tower base pivot point **114**, one or more lights **116**, a trailer jack **118**, a control enclosure **120**, controls **122**, a charge controller **124**, jumper cables **126** and a generator **128**. In the travel mode, the tower **112** is positioned in a lowered position so that the tower **112** and lights **116** do not hit objects. Additionally, in travel mode, the solar modules **106** and the backplates **104** are positioned in a closed position so that the solar modules **106** face inward and are protected with the backplates **104** facing outward.

The frame **102** is able to be any shape, size or configuration to meet any or all of the desired goals of the portable solar light tower **100**. In some embodiments, the frame **102** includes a floor and other standard frame components of a trailer such as wheels, an axle and support members for the trailer. In some embodiments, the frame **102** is also referred to as a trailer. The frame **102** is configured to couple to the backplates **104**. In some embodiments, the frame is a Diamond Plate base with a built-in battery compartment. In some embodiments, where the frame **102** is not configured as a trailer, the frame **102** is able to include fewer or more components such as no wheels. In some embodiments, the frame includes a support **160** (FIG. 6) to support the extension tower **112** and the lights **116**. The support **160** (FIG. 6) is configured to receive the extension tower **112**. The frame **102** is able to be constructed out of any material such as stainless steel, other metals, plastic, wood, rubber, other materials or any combination thereof.

The backplates **104** are configured to couple to the frame **102**. The backplates **104** are also configured to be able to

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move/rotate between an open configuration and a closed configuration. The backplates **104** are configured to move/rotate between an open and closed configuration using an automated system or manually. In the closed configuration, the backplates **104** protect the solar modules **106** from objects such as debris, rocks and other potentially harmful items that could damage the solar modules **106**. In some embodiments, the backplates **104** include a locking device to ensure the backplates **104** maintain the desired position. The backplates **104** are able to be constructed out of any material such as stainless steel, other metals, plastic, wood, rubber, other materials or any combination thereof. In some embodiments, the backplates **104** are part of the solar modules **106** and are back plates of the solar modules **106**.

The solar modules **106** are positioned on the opposite side of the backplates **104** so that when the backplates **104** are in a closed configuration, the solar modules **106** are protected. The solar modules **106** are able to be any type of solar module/panel. Any number of solar modules **106** are able to be used from one to many. In some embodiments, two Mitsubishi 125W lead-free panels are used. The solar modules **106** are coupled to the batteries **110**. In some embodiments, each solar module **106** is a photovoltaic module mounted to the trailer base via a pivoting bracket allowing the panels to fold out over the trailer fenders for charging and fold up to a vertical (or closed) position for transport. This mounting method also allows for the use of a wide range of solar panels for trailer scalability and versatility. In some embodiments, shock absorbers **136** (FIG. 2) run from the trailer base to the back side of the solar panel mounts to prevent the panels from slamming down when folding out into the charge mode.

The battery box **108** is an enclosure to store the batteries **110**. The battery box **108** is able to be located anywhere on or within the frame. In some embodiments, the battery box **108** is positioned under the frame, and in some embodiments, the battery box **108** is positioned on top of the frame. In some embodiments, the battery box **108** is positioned elsewhere. The battery box **108** is able to be a minimal, partial or full enclosure for the batteries **110**.

The batteries **110** are stored within the battery box **108**. The number of batteries **110** is able to range from one to many. The batteries **110** are able to be any type of battery. In some embodiments, the batteries are sealed, maintenance-free batteries or battery banks. In some embodiments, four MK Gel Sealed maintenance-free 98ah batteries are used. In some embodiments, a charge controller **124** is included as well, such as a Xantrex C-30 controller.

The extension tower **112** is coupled to the frame **102**. In some embodiments, the extension tower **112** is coupled to the frame at a pivoting bracket **114** which allows the tower **112** to fold down for travel mode and be erected at various heights for the lighting mode. In some embodiments, the extension tower **112** includes telescoping capabilities. In some embodiments, a gear-driven cable winch and pulley system **130** (FIG. 2) is able to be used to raise and lower the extension tower **112**. The gear-driven cable winch and pulley system **130** (FIG. 2) is able to be operated by a hand crank or a small motor (such as an electric motor). In some embodiments, the extension tower **112** is pre-loaded with a spring which goes from the trailer base to the extension tower **112** in order to keep tension on the winch/pulley system **130** (FIG. 2). A cable routed internally through the extension tower **112** coupled to the base of the extension portion of the extension tower **112**, a pulley at the pivot point **114** of the tower **112** and return spring are used to prevent tower **112** over-extension. In some embodiments, the exten-

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sion tower **112** is able to move from a travel mode to a lighting mode by other means such as telescoping up and down, or other implementations. The extension tower **112** is able to be constructed out of any material such as stainless steel, other metals, plastic, wood, rubber, other materials or any combination thereof. Coupled to the tower **112** are lights **116**.

The lights **116** are coupled to the extension tower **112**. The lights are able to be any kind of lights such as floodlights, Light Emitting Diode (LED) floodlights or others. In some embodiments, the LED floodlights include 600 LEDs, require 36 W of power and produce cool white light. The lights **116** are able to be mounted or coupled to the extension tower **112** in any manner. In some embodiments, a U-bracket is used to be able to adjust aiming and mounting. Thus, in some embodiments, the height and the angle of the lights **116** on the extension tower **112** is able to be adjusted. The light fixture containing the lights **116** is able to be constructed of any appropriate material. In some embodiments, the light fixture is constructed of cast aluminum with an impact resistant lens. In some embodiments, the lights **116** provide a color other than white light.

The trailer jack **118** allows the frame **102** to be coupled to a trailer hitch such as on a car/truck. By using a trailer configuration, the design is simplified and standard cars/trucks with trailer hitches are able to transport the portable solar light tower **100**.

In some embodiments, a control enclosure **120** contains a control system **122**. The control enclosure **120** and control system **122** are able to be located anywhere in the portable solar light tower **100**. Easy access to the control system **122** is beneficial. The control system **122** is able to control any or all of the components within the portable solar light tower **100** depending on the embodiment. For example, the control system **122** is able to control to moving/rotating of the solar modules **106** between a closed and an open configuration (also referred to as a transport mode and a charge mode). In some embodiments, the control system **122** is also able to control raising and lower of the extension tower **112** and other components. In some embodiments, the control system **122** includes a dimmer switch to control the amount of light and extend battery use. The control system **122** is able to be any type of implementation such as buttons, levers and/or a computer system. In some embodiments, the control system **122** is waterproofed or protected against water in some manner. In some embodiments, the control enclosure **120** includes a charge controller **124**. The charge controller **124** ensures proper functionality between the solar modules **106** and the batteries **108**. In some embodiments, the charge controller **124** is located elsewhere. In some embodiments, the control system **122** includes switchgear, possibly a Low Voltage Directive (LVD) switchgear.

In some embodiments, a hardwired set of jumper cables **126** are built into the battery compartment for emergency charging in the event of an LVD situation during operation. The batteries **110** are able to be easily quick-charged from a vehicle and/or be used to jumpstart a vehicle in a reverse scenario using the jumper cables **126**.

In some embodiments, a generator **128** is included. The generator **128** is able to be used in the event of an LVD situation or to run additional tools or provide power for other purposes. In some embodiments, the generator **128** is a Honda whisper silent generator or another very quiet generator.

FIG. 2 illustrates a side view of a portable solar light tower **100** in a travel mode in accordance with some embodiments. In addition to the components and structure

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described above, the portable solar light tower **100** includes other components, in some embodiments. As described briefly above, the winch/pulley system **130** is able to be used to raise and lower the extension tower **112**. The gear-driven cable winch and pulley system **130** is able to be operated by a hand crank, a motor (e.g. electric) or some other device. In some embodiments, the extension tower **112** is pre-loaded with a spring which goes from the trailer base to the tower **112** in order to keep tension on the winch/pulley system **130**. Other implementations instead of the winch/pulley system **130** or variations of the winch/pulley system **130** are also able to be used. Using a cable routed internally through the extension tower **112** coupled to the base of the extension portion of the tower, a pulley at the pivot point **114** of the tower and a return spring **132** are used to prevent tower overextension. To enable the solar modules **106** to move/rotate/pivot and be mounted to the frame **102**, a solar panel pivot point/mounting bracket **134** is used. Other pivot/mounting implementations are able to be used. As described briefly above, one or more shock absorbers **136** are able to be used to prevent the solar modules **106** from slamming down when folding out into the charge mode.

FIG. 3 illustrates a rear view of a portable solar light tower **100** in a travel mode in accordance with some embodiments. The rear view shows the lights **116** in a down position, the solar modules **106** in a closed position which is upright with the backplate **104** on the outside protecting the solar module **106**. The rear view also shows the battery compartment **108** below the frame **102**.

FIG. 4 illustrates a top view of a solar panel backplate **104** in accordance with some embodiments. The backplate **104** protects the fragile rear side of the solar module **106** (FIG. 1). In some embodiments, the backplate **104** is welded to a tubular steel framework **140** which couples to the trailer base via a pivotal shaft at a pivot point **142** enabling the solar modules **106** (FIG. 1) to fold out over the fenders of the trailer for charge mode and fold up to a vertical position for travel mode. Shock absorbers **136** (FIG. 2) are coupled to the steel framework of the panel mounts at a shock absorber mount **144** and to the trailer frame **102** (FIG. 1) to prevent the panels from slamming down when folding out for charge mode. A trailer mount bracket **146** and a trailer side shock absorber mount **148** are also shown.

FIG. 5 illustrates an exemplary wiring diagram for the portable solar light tower in accordance with some embodiments. The solar modules **106** (FIG. 1) are coupled to an input of a charge controller **124** (FIG. 1), and an output of the charge controller **124** (FIG. 1) is coupled to a battery bank **108** (FIG. 1) for storing the power generated by the solar modules **106** (FIG. 1). The battery bank **108** (FIG. 1) is then coupled to an input of switch gear & LVD **122** (FIG. 1), and an output of the switch gear & LVD **122** (FIG. 1) is coupled to the lights **116** (FIG. 1). Other wiring schemes are possible. Further, more or fewer components are able to be included.

FIG. 6 shows a back perspective view of a portable solar light tower **100** in a travel mode in accordance with some embodiments. FIG. 7 shows a front perspective view of a portable solar light tower **100** in a travel mode in accordance with some embodiments. Referring to FIGS. 6 and 7, as described above, the frame **102** or trailer is the main structure which is able to include typical trailer components such as wheels, tail lights and other features. The backplates **104** protect the solar modules **106** when configured in the closed position or travel mode. The battery box/enclosure **108** is located below the frame and stores the batteries **110** (FIG. 1) for storing the power and powering the lights and

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possibly other components. The extension tower **112** is coupled to the frame at a base pivot point **114** to allow the lights **116** and the tower **112** to be down in the lowered position as shown for travel mode. The winch/pulley system **130** is able to be used to raise and lower the extension tower **112** and the lights **116**. A support **160** is able to support the extension tower **112** and the lights **116**.

FIG. **8** shows a back perspective view of a portable solar light tower **100** converting from a travel mode to a use and/or charge mode in accordance with some embodiments. As described above, a winch/pulley system **130** or other mechanism is able to be used to raise the extension tower **112** and lights **116**. In some embodiments, the solar modules **106** are positioned in an open configuration to receive sunlight and charge the batteries **110**, such as by manually moving/pushing/rotating them. In some embodiments, at the same time as the extension tower **112** is raised, the solar modules **106** also fold out and are positioned in an open configuration.

FIG. **9** shows a front perspective view of a portable solar light tower **100** in a use and/or charge mode in accordance with some embodiments. In use mode, the extension tower **112** and lights **116** are approximately vertical. The specific height and angle of the lights **116** is able to be changed. In charge mode, the solar modules **106** are configured in an open configuration to acquire sunlight. In some embodiments, the configuration of the solar modules **106** is such that the modules **106** are slightly angled so that they receive direct sunlight at different times of the day. In some embodiments, the solar modules **106** are configured to lie flat. In some embodiments, the solar modules **106** are able to manually or automatically move with the sun to maximize the amount of sunlight received. In some embodiments, in use mode, the solar modules **106** are configured in the closed position to protect them at night. In some embodiments, in charge mode, the extension tower **112** and lights **116** are configured in the closed position (also referred to as the lowered or down position) to prevent the portable solar light tower **100** from being an eyesore in the daytime.

There are at least two or three different modes that the portable solar light tower **100** is able to be configured in. In the transport mode, the solar modules **106** are positioned in a closed configuration with the backplates **104** protecting the modules **106**. Additionally, the extension tower **112** and lights **116** are positioned in a down position to avoid hitting other objects. In the charge mode, the solar modules **106** are opened to receive sunlight. In the use mode, the extension tower **112** and the lights **116** are positioned in the vertical configuration. The vertical configuration is changeable as desired, such as by moving up and down and angling.

FIG. **10** illustrates a flowchart of a method of utilizing the portable solar light tower in accordance with some embodiments. In the step **1000**, the user configures the portable solar light tower into a transport mode. To transport the portable solar light tower, the extension tower and lights are configured in a down configuration, and the solar panels are configured in a closed configuration with the protective backplates facing outward. In some embodiments, these configurations are able to be locked into place. If the portable solar light tower is configured in the transport mode, then, in the step **1002**, the user is able to transport the portable solar light tower safely without harming other objects or the solar panels. In some embodiments, the portable solar light tower is transported by hooking the trailer up to a vehicle and pulling it similar to any other trailer. If the portable solar light tower is already at its desired location, the steps **1000** and **1002** are able to be

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skipped. In the step **1004**, the portable solar light tower is configured in the charge mode to charge the batteries. To configure the portable solar light tower in the charge mode, the user opens the solar panels into an open configuration so that they are able to acquire sunlight. In the step **1006**, the batteries are charged using the solar panels, wind power generate and/or any other power generator. Typically, the batteries are charged during the daytime when the sun is shining. In the step **1008**, to use the lights to illuminate an area, the extension tower and the lights are raised and configured to a desired height and angle. In some embodiments, the extension tower and the lights are raised using a winch/pulley system. Then, in the step **1010**, using the control system, the lights are turned on. As described, the lights are able to be dimmed, moved and angled into different positions. Typically, the lights are used at nighttime (e.g. for nighttime road construction). When the light is no longer needed, the lights are turned off, and the lights are able to be lowered. In some embodiments, fewer or additional steps are able to be implemented. Additionally, the order of the steps is able to be modified.

In some embodiments, one or more wind turbines are included to further generate power. In some embodiments, the frame is not a trailer and is another shape or form. In some embodiments, the solar light tower is for use at home such as lighting a user's backyard. In some embodiments, the solar light tower is stationary.

To utilize the portable solar light tower, the user first configures the portable solar light tower into the desired mode. To transport the portable solar light tower, the extension tower and lights are configured in a down configuration, and the solar panels are configured in a closed configuration with the protective backplates facing outward. In some embodiments, these configurations are able to be locked into place. The user is then able to transport the portable solar light tower safely without harming other objects or the solar panels. In some embodiments, the portable solar light tower is transported by hooking the trailer up to a vehicle and pulling it similar to any other trailer. To charge the batteries, the user opens the solar panels into an open configuration so that they are able to acquire sunlight. To use the lights to illuminate an area, the extension tower and the lights are raised and configured to a desired height and angle. In some embodiments, the extension tower and the lights are raised using a winch/pulley system. Then, using the control system, the lights are turned on. As described, the lights are able to be dimmed, moved and angled into different positions. When the light is no longer needed, the lights are turned off, and the lights are able to be lowered.

In operation, the portable solar light tower is able to be used to illuminate construction sites and various other lighting needs by providing a self-contained light source for remote locations. The user is able to turn on the lights via dimmer switching, thus controlling the amount of light supplied to the desired area and extending run time. The portable solar light tower is supplied with energy to power the lights via batteries which are charged by solar panels. The light tower includes a telescoping arm that is able to be extended when a larger footprint of light is desired. When the user wants to relocate the portable solar light tower, the tower collapses easily, the solar panels fold up into a protective mode and the portable solar light tower is able to be pulled like a trailer. Since the portable solar light tower uses solar power instead of diesel fuel it is able to save a user money. Users do not need to worry about the cost of oil rising as it will not affect the cost of powering the portable solar light tower. Unlike an extremely loud diesel generator,

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the portable solar light tower is very quiet. Furthermore, the portable solar light tower does not generate any potentially harmful emissions.

The present invention has been described in terms of specific embodiments incorporating details to facilitate the understanding of principles of construction and operation of the invention. Such reference herein to specific embodiments and details thereof is not intended to limit the scope of the claims appended hereto. It will be readily apparent to one skilled in the art that other various modifications may be made in the embodiment chosen for illustration without departing from the spirit and scope of the invention as defined by the claims.

We claimed:

1. A solar power device, comprising:
 - a. a portable base, wherein the portable base is part of a trailer;
 - b. a plurality of solar panels coupled to the portable base for converting solar energy into electricity; and
 - c. a light coupled to the portable base for illuminating an area using the electricity from the plurality of solar panels,
 wherein the plurality of solar panels fold out over fenders of the trailer,
 wherein at least one solar panel of the plurality of solar panels is rotatable from a horizontal position to a substantially vertical position, wherein the substantially vertical position faces inward toward the trailer.
2. The device of claim 1 further comprising a protective back plate for protecting the plurality of solar panels.
3. The device of claim 1 further comprising a battery for storing the electricity and providing the electricity to the light.
4. The device of claim 1 further comprising a control panel for controlling the light and the plurality of solar panels.
5. The device of claim 1 further comprising a pivotable, telescoping tower coupling the light to the portable base, wherein the telescoping tower is extendable and pivotable between a down position to an up position.
6. The device of claim 5 further comprising a winch and pulley system for moving the telescoping tower between the down position to the up position.
7. The device of claim 1 further comprising anti-slam shock absorbers coupled to the portable base for preventing the plurality of solar panels from slamming open.
8. The device of claim 1 wherein the plurality of solar panels are rotatable to an open position to acquire the solar energy and a closed position to protect the solar panel.
9. The device of claim 1 wherein the light is selected from the group consisting of one or more floodlights and one or more light emitting diode floodlights.
10. A solar powered battery operated portable light tower, comprising:
 - a. a frame of a trailer;
 - b. a first enclosure supported by the frame, the enclosure including one or more batteries;
 - c. a second enclosure containing controls;
 - d. an extension tower including a set of light emitting diode floodlights;
 - e. a system to extend and contract the tower; and
 - f. a plurality of solar panels mounted on pivotal brackets each with a protective back plate,
 wherein the plurality of solar panels rotate out over fenders of the trailer,

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wherein at least one solar panel of the plurality of solar panels is rotatable from a horizontal position to a closed position, wherein the closed position faces inward toward the trailer.

11. The light tower of claim 10 wherein the controls comprise a control panel for controlling the set of light emitting diode floodlights and the plurality of solar panels.

12. The light tower of claim 10 wherein the tower comprises a pivotable, telescoping tower coupling the floodlights to the frame, wherein the telescoping tower is extendable and pivotable between a down position to an up position.

13. The light tower of claim 10 wherein the plurality of solar panels are rotatable to the horizontal position to acquire the solar energy and the closed position to protect the solar panel.

14. A method of utilizing a portable solar light tower comprising:

- a. configuring a portable solar light tower in a transport mode, wherein the portable solar light tower is part of a trailer;
- b. transporting the portable solar light tower;
- c. configuring the portable solar light tower in a charge mode, wherein a plurality of solar panels rotate out over fenders of the trailer, wherein at least one solar panel of the plurality of solar panels is rotatable to an elevated position, wherein the elevated position faces inward toward the trailer;
- d. charging a battery using the plurality of solar panels of the portable solar light tower;
- e. configuring the portable solar light tower in a light mode; and
- f. lighting an area.

15. The method of claim 14 wherein configuring the portable solar light tower in the transport mode includes placing a tower in a down position and placing the plurality of solar panels in a protected position with a back plate protecting each of the solar panels.

16. The method of claim 14 wherein configuring the portable solar light tower in the charge mode includes placing the plurality of solar panels in a position to receive sunlight.

17. The method of claim 14 wherein configuring the portable solar light tower in the light mode includes raising a tower into a substantially upright position.

18. A system for illuminating an area at night using a renewable energy source comprising:

- a. an energy acquisition component acquiring energy from the renewable energy resource;
- b. a protective component for protecting the energy acquisition component, wherein the protective component is coupled to a trailer, wherein the energy acquisition component faces inward toward the trailer when in an elevated position, wherein the energy acquisition component rotates out over a fender of the trailer;
- c. a lighting component for illuminating the area; and
- d. a raising component for raising the lighting component.

19. The system of claim 18 further comprising a battery for storing the electricity and providing the electricity to the light.

20. The system of claim 18 further comprising a control component for controlling the lighting component and the energy acquisition component.

21. The system of claim 18 wherein the raising component comprises a pivotable, telescoping tower coupling the lighting component to the transporting component, wherein

the telescoping tower is extendable and pivotable between a down position to an up position.

22. The system of claim 18 wherein the raising component comprises a winch and pulley system for moving the telescoping tower between the down position to the up position. 5

23. The system of claim 18 wherein the protective component further comprises anti-slam shock absorbers for preventing the energy acquisition component from slamming open. 10

24. The system of claim 18 wherein the energy acquisition component is rotatable to an open position to acquire solar energy and a closed position to protect the energy acquisition component.

25. The system of claim 18 wherein the light is selected from the group consisting of one or more floodlights and one or more light emitting diode floodlights. 15

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